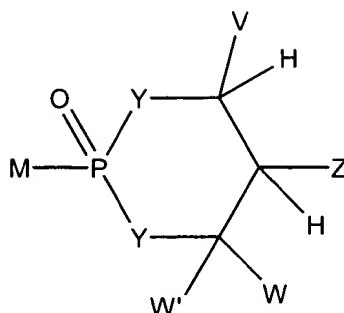


We Claim:

1. A compound of formula I:



I

wherein:

V, W, and W' are independently selected from the group of -H, alkyl, aralkyl, alicyclic, aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl, and 1-alkynyl; or

together V and Z are connected via an additional 3-5 atoms to form a cyclic group containing 5-7 atoms, optionally 1 heteroatom, substituted with hydroxy, acyloxy, alkoxycarbonyloxy, or aryloxy carbonyloxy attached to a carbon atom that is three atoms from both Y groups attached to the phosphorus; or

together V and Z are connected via an additional 3-5 atoms to form a cyclic group, optionally containing 1 heteroatom, said cyclic group is fused to an aryl group at the beta and gamma position to the Y adjacent to V;

together V and W are connected via an additional 3 carbon atoms to form an optionally substituted cyclic group containing 6 carbon atoms and substituted with one substituent selected from the group of hydroxy, acyloxy, alkoxycarbonyloxy, alkylthiocarbonyloxy, and aryloxy carbonyloxy, attached to one of said additional carbon atoms that is three atoms from a Y attached to the phosphorus;

together Z and W are connected via an additional 3-5 atoms to form a cyclic group, optionally containing one heteroatom, and V must be aryl, substituted aryl, heteroaryl, or substituted heteroaryl;

together W and W' are connected via an additional 2-5 atoms to form a cyclic group, optionally containing 0-2 heteroatoms, and V must be aryl, substituted aryl, heteroaryl, or substituted heteroaryl;

Z is selected from the group of  $-\text{CHR}^2\text{OH}$ ,  $-\text{CHR}^2\text{OC}(\text{O})\text{R}^3$ ,  $-\text{CHR}^2\text{OC}(\text{S})\text{R}^3$ ,  $-\text{CHR}^2\text{OC}(\text{S})\text{OR}^3$ ,  $-\text{CHR}^2\text{OC}(\text{O})\text{SR}^3$ ,  $-\text{CHR}^2\text{OCO}_2\text{R}^3$ ,  $-\text{OR}^2$ ,  $-\text{SR}^2$ ,  $-\text{CHR}^2\text{N}_3$ ,  $-\text{CH}_2\text{aryl}$ ,  $-\text{CH}(\text{aryl})\text{OH}$ ,  $-\text{CH}(\text{CH}=\text{CR}^2)\text{OH}$ ,  $-\text{CH}(\text{C}\equiv\text{CR}^2)\text{OH}$ ,  $-\text{R}^2$ ,  $-\text{NR}^2$ ,  $-\text{OCOR}^3$ ,  $-\text{OCO}_2\text{R}^3$ ,  $-\text{SCOR}^3$ ,  $-\text{SCO}_2\text{R}^3$ ,  $-\text{NHCOR}^2$ ,  $-\text{NHCO}_2\text{R}^3$ ,  $-\text{CH}_2\text{NHaryl}$ ,  $-(\text{CH}_2)_p\text{-OR}^{12}$ , and  $-(\text{CH}_2)_p\text{-SR}^{12}$ ;

p is an integer 2 or 3;

with the provisos that:

- a) V, Z, W, W' are not all -H;
- b) when Z is  $-\text{R}^2$  or  $-\text{OR}^2$ , then V is not -H, alkyl, aralkyl, or alicyclic;
- c) when Z is  $\text{CHR}^2\text{OH}$ , then M is not  $-\text{NH}(\text{lower alkyl})$ ,  $-\text{N}(\text{lower alkyl})_2$ ,  $-\text{NH}(\text{lower alkylhalide})$ ,  $-\text{N}(\text{lower alkylhalide})_2$  or  $-\text{N}(\text{lower alkyl})(\text{lower alkylhalide})$ ;

and

- d) when V is aryl or substituted aryl, then M is not  $-\text{O}(\text{D})$  where D is hydrogen, a metal ion or an ammonium ion;

$\text{R}^2$  is selected from the group of  $\text{R}^3$  and -H;

$\text{R}^3$  is selected from the group of alkyl, aryl, alicyclic, and aralkyl;

$\text{R}^6$  is selected from the group of -H, lower alkyl, acyloxyalkyl, alkoxycarbonyloxyalkyl, and lower acyl;

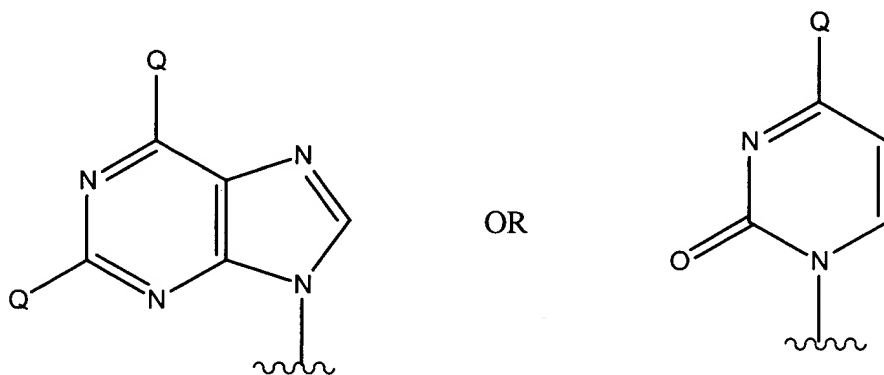
$\text{R}^{12}$  is selected from the group of -H, and lower acyl;

each Y is independently selected from the group of -O-, and  $-\text{NR}^6$ -;

M is selected from the group of drugs MH containing an -OH,  $-\text{NHR}^2$ , or

-SH group, and that is attached to the phosphorus in formula I via O, N, or S of said OH, -NHR<sup>2</sup>, or SH group;  
and pharmaceutically acceptable prodrugs and salts thereof.

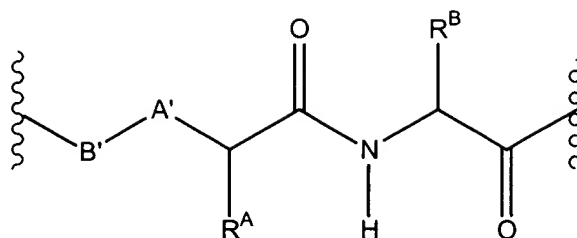
2. A compound according to claim 1, with the further proviso that when Z is CHR<sup>2</sup>OH and V, W, and W' are H, then M does not include within its structure adenine, cytosine, guanine, thymine, uracil, 2,6-diamino purine, hypoxanthine, or a compound of the formula:



wherein Q is independently H, Cl, NHR<sup>Q</sup>, NR<sup>Q</sup><sub>2</sub>, NHC(O)R<sup>Q</sup>, N(C(O)R<sup>Q</sup>)<sub>2</sub>, OH or NCHN(R<sup>Q</sup>)<sub>2</sub>; and

R<sup>Q</sup> is C<sub>1</sub>-C<sub>20</sub> alkyl, aryl or aralkyl all optionally substituted with hydroxy or halogen.

3. A compound according claim 1, with the further proviso that when Z, W, and W' are H and V is aryl, substituted aryl, heteroaryl or substituted heteroaryl, then M does not include within its structure a group of the following formula:



A' is NH or (CH<sub>2</sub>)<sub>k</sub> where k is an integer from 0 to 3; and  
B' is carbonyl or SO<sub>2</sub>.

# Introduction

6. A compound according to claim 5 wherein MH is selected from the group of etoposide, teniposide, doxorubicin, pirarubicin, mitoxantrone, topotecan,

irinotecan, combretastatin A-4, S,S-dioxolane combretastatin, neocarzinostatin, and calicheamicin.

7. A compound according to claim 1 wherein at least one Y group is -O-.

8. A compound according to claim 7 wherein both Y groups are -O-, or when one Y group is -O-, then it is located closest to the W' and W groups.

9. A compound according to claim 8 wherein both Y groups are -O-.

10. A compound according to claim 1 wherein

V is selected from the group of aryl, substituted aryl, heteroaryl, and substituted heteroaryl;

W, and W' are independently selected from the group of -H, alkyl, aralkyl, alicyclic, aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl, and 1-alkynyl; or

together V and W are connected via an additional 3 carbon atoms to form an optionally substituted cyclic group containing 6 carbon atoms and substituted with one substituent selected from the group of hydroxy, acyloxy, alkoxycarbonyloxy, alkylthiocarbonyloxy, and aryloxycarbonyloxy, attached to one of said carbon atoms that is three atoms from a Y attached to the phosphorus; or

together Z and W are connected via an additional 3-5 atoms to form a cyclic group, optionally containing one heteroatom; or

together W and W' are connected via an additional 2-5 atoms to form a cyclic group, optionally containing 0-2 heteroatoms.

11. A compound according to claim 1, wherein

V, W and W' are independently selected from the group of aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl and 1-alkynyl, and Z is selected from the group of  $-OR^2$ ,  $-SR^2$ ,  $-R^2$ ,  $-NR^2$ ,  $-OCOR^3$ ,  $-OCO_2R^3$ ,  $-SCOR^3$ ,  $-SCO_2R^3$ ,  $-NHCOR^2$ ,  $-NHCO_2R^3$ ,  $-(CH_2)_p-OR^{12}$ , and  $-(CH_2)_p-SR^{12}$ ; or

V, W, and W' are independently selected from the group of H, alkyl, aralkyl and alicyclic, and Z is selected from the group of  $-CHR^2OH$ ,  $-CHR^2OC(O)R^3$ ,  $-CHR^2OC(S)R^3$ ,  $-CHR^2OCO_2R^3$ ,  $-CHR^2OC(O)SR^3$ ,  $-CHR^2OC(S)OR^3$ ,  $-SR^2$ ,  $-CH_2$ aryl,  $-CH(aryl)OH$ ,  $-CH(CH=CR^2_2)OH$ ,  $-CH(C\equiv CR^2)OH$ ; and  $-CH_2NH$ aryl; or

together V and W are connected via an additional 3 carbon atoms to form a cyclic substituted group containing 6 carbon atoms and mono-substituted with a substituent selected from the group of hydroxyl, acyloxy, alkoxy, carbonyloxy, alkylthiocarbonyloxy, and aryloxy, carbonyloxy attached to one of said additional carbon atoms that is three atoms from an Y attached to the phosphorus.

12. A compound according to claim 11, wherein V is selected from the group of aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl and 1-alkynyl, and Z is selected from the group of  $-OR^2$ ,  $-SR^2$ ,  $-R^2$ ,  $-NR^2$ ,  $-OCOR^3$ ,  $-OCO_2R^3$ ,  $-SCOR^3$ ,  $-SCO_2R^3$ ,  $-NHCOR^2$ ,  $-NHCO_2R^3$ ,  $-(CH_2)_p-OR^{12}$ , and  $-(CH_2)_p-SR^{12}$ .

13. A compound according to claim 11, wherein V, W and W' are independently selected from the group of H, alkyl, aralkyl and alicyclic, and Z is selected from the group of  $-CHR^2OH$ ,  $-CHR^2OC(O)R^3$ ,  $-CHR^2OC(S)R^3$ ,  $-CHR^2OCO_2R^3$ ,  $-CHR^2OC(O)SR^3$ ,  $-CHR^2OC(S)OR^3$ ,  $-SR^2$ ,  $-CH_2$ aryl,  $-CH(aryl)OH$ ,  $-CH(CH=CR^2_2)OH$ ,  $-CH(C\equiv CR^2)OH$ ; and  $-CH_2NH$ aryl.

14. A compound according to claim 11, wherein together V and W are connected via an additional 3 carbon atoms to form a cyclic group containing 6 carbon

15. A compound according to claim 12 wherein Z, W, and W' are H; and R<sup>6</sup> is selected from the group of -H and lower alkyl.

17. A compound according to claim 16 wherein V is selected from the group of phenyl and substituted phenyl.

19. A compound according to claim 15 wherein V is selected from the group of heteroaryl and substituted heteroaryl.

21. A compound according to claim 1 wherein together V and Z are connected via an additional 3-5 atoms to form a cyclic group, optionally containing 1 heteroatom, that is fused to an aryl group at the beta and gamma positions to the Y attached to phosphorus.

22. A compound according to claim 21 wherein said aryl group is an optionally substituted monocyclic aryl group and the connection between Z and the aryl group is selected from the group of O, CH<sub>2</sub>, CH<sub>2</sub>CH<sub>2</sub>, OCH<sub>2</sub> or CH<sub>2</sub>O.

23. A compound according to claim 11 wherein together V and W are connected via an additional 3 carbon atoms to form an optionally substituted cyclic group containing 6 carbon atoms and mono-substituted with one substituent selected from the group of hydroxy, acyloxy, alkoxycarbonyloxy, alkylthiocarbonyloxy, and aryloxycarbonyloxy attached to one of said additional carbon atoms that is three atoms from an Y attached to the phosphorus.

24. A compound according to claim 23 wherein together V and W form a cyclic group selected from the group of -CH<sub>2</sub>-CH(OH)-CH<sub>2</sub>-, -CH<sub>2</sub>CH(OCOR<sup>3</sup>)-CH<sub>2</sub>-, and -CH<sub>2</sub>CH(OCO<sub>2</sub>R<sup>3</sup>)-CH<sub>2</sub>-.

25. A compound according to claim 13 wherein W, W' and V are -H.

26. A compound according to claim 12 wherein Z is selected from the group of -OR<sup>2</sup>, -R<sup>2</sup>, -OCOR<sup>3</sup>, -OCO<sub>2</sub>R<sup>3</sup>, -NHCOR<sup>2</sup>, -(CH<sub>2</sub>)<sub>p</sub>-OR<sup>12</sup>, and -(CH<sub>2</sub>)<sub>p</sub>-SR<sup>12</sup>.

27. A compound according to claim 26 wherein Z is selected from the group of -OR<sup>2</sup>, -R<sup>2</sup>, -OCOR<sup>3</sup>, -OCO<sub>2</sub>R<sup>3</sup>, and -NHCOR<sup>2</sup>.

28. A compound according to claim 27 wherein Z is selected from the group of H and lower alkyl.



29. A compound according to claim 10 wherein W and W' are independently selected from the group of H, alkyl, aralkyl, alicyclic, aryl, substituted aryl, heteroaryl, substituted heteroaryl, 1-alkenyl and 1-alkynyl.

30. A compound according to claim 29 wherein W and W' are the same group.

31. A compound according to claim 30 wherein W and W' are H.

32. A compound according to claim 12 wherein M is attached to phosphorus via an oxygen or nitrogen atom.

33. A compound according to claim 32 wherein V is selected from the group of aryl and substituted aryl.

34. A compound according to claim 33 wherein V is selected from the group of phenyl, 3,5-dichlorophenyl, 3-bromo-4-fluorophenyl, 3-chlorophenyl, 2-bromophenyl, and 3-bromophenyl.

35. A compound according to claim 32 wherein V is selected from the group of heteroaryl and substituted heteroaryl.

36. A compound according to claim 35 wherein V is 4-pyridyl.

37. A compound according to claim 13 wherein M is attached to the phosphorus via a nitrogen or oxygen atom.

38. A compound according to claim 37 wherein Z is selected from the group of  $-\text{CHR}^2\text{OH}$ ,  $-\text{CHR}^2\text{OC}(\text{O})\text{R}^3$ , and  $-\text{CHR}^2\text{OCO}_2\text{R}^3$ , and wherein  $\text{R}^2$  is H or aryl.

39. A compound according to claim 38 wherein  $\text{R}^2$  is -H.

40. A compound according to claim 12 wherein  $\text{W}'$  and Z are -H, W and V are both the same aryl, substituted aryl, heteroaryl, or substituted heteroaryl, and V and W are cis to each other.

41. A compound according to claim 12 wherein W and  $\text{W}'$  are H, V is selected from the group of aryl, substituted aryl, heteroaryl, substituted heteroaryl, and Z is selected from the group of -H,  $\text{OR}^2$ , and  $-\text{NHCOR}^2$ .

42. A compound according to claim 41 wherein Z is -H.

43. A compound according to claim 42 wherein V is selected from the group of phenyl and substituted phenyl.

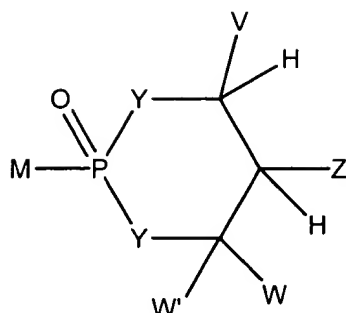
44. A compound according to claim 42 wherein V is an optionally substituted monocyclic heteroaryl containing at least one nitrogen atom.

45. A compound according to claim 44 wherein V is 4-pyridyl.

46. A compound according to claim 41 wherein V is selected from the group of phenyl, phenyl substituted with 1-3 halogens, and 4-pyridyl and MH is selected from the group of etoposide, doxorubicin, and taxol.

47. A compound according to claim 42 wherein M is attached to the phosphorus via an oxygen atom.
48. A compound according to claim 1 wherein MH is from the class epipodophyllotoxins.
49. A compound according to claim 48 wherein MH is selected from the group of Etoposide, Teniposide, NK-611, GL-331, and Azatoxin.
50. A compound according to claim 1 wherein MH is from the class Camptothecins.
51. A compound according to claim 50 where MH is selected from the group of Camptothecin, Topotecan, Irinotecan, Lurtotecan, 9-aminocamptothecin, GL-211, DX-8951F, SKF 107874, and SKF 108025.
52. A compound according to claim 50 wherein MH is attached to phosphorus via the C-20 hydroxyl group.
53. A compound according to claim 50 wherein MH is selected from the group of Camptothecin, Topotecan, Irinotecan, Lurtotecan, and 9-aminocamptothecin.
54. A compound according to claim 1 wherein MH is selected from the class combretastatin analogues.
55. A compound according to claim 1 wherein MH is selected from the class of anthracyclines.

56. A compound according to claim 1 wherein MH is from the class of Anthracyclines.
57. A compound according to claim 56 wherein MH is selected from the group of Doxorubicin, Daunorubicin, Idarubicin, Pirarubicin, and Epirubicin.
58. A compound according to claim 56 wherein MH is attached to phosphorus via a glycosidic amine.
59. A compound according to claim 56 wherein MH is attached to phosphorus via an alcohol or phenolic hydroxy.
60. A compound according to claim 59 wherein MH is attached to phosphorus via a glycoside hydroxyl.
61. A compound according to claim 57 wherein MH is selected from the group of Pirarubicin and Doxorubicin.
62. A compound according to claim 61 wherein MH is attached to phosphorus via a glycosidic amine, an alcohol or a phenolic hydroxyl.
63. A compound according to claim 1 wherein MH is from the class Eneidyne antibiotics.
64. A compound according to claim 1 wherein MH is from the class Taxanes.
65. A compound of formula I:



W and W' are independently selected from the group of -H, alkyl, aryl, substituted aryl, heteroaryl, and substituted heteroaryl;

Z is selected from the group of  $-\text{OR}^2$ ,  $-\text{SR}^2$ ,  $-\text{R}^2$ ,  $-\text{NR}^2$ ,  $-\text{OCOR}^3$ ,  $-\text{OCO}_2\text{R}^3$ ,  $-\text{SCOR}^3$ ,

$p$  is an integer 2 or 3;

a) when V is aryl or substituted aryl, then M is not  $-O(D)$  where D is hydrogen, a metal ion or an ammonium ion; and

$R^2$  is selected from the group of  $R^3$  and -H;

R<sup>6</sup> is selected from the group of -H, lower alkyl, acyloxyalkyl,

R<sup>12</sup> is selected from the group of -H, and lower acyl;

145

and pharmaceutically acceptable prodrugs and salts thereof.

FBPase inhibitor.

losoxantrone.

calicheamicin.

69. A compound according to claim 65 wherein at least one Y group is -O-.

when one Y group is -O-, then it is located closest to the W' and W groups.

71. A compound according to claim 70 wherein both Y groups are -O-.
72. A compound according to claim 71 wherein Z, W, and W' are H; and V is selected from the group of aryl, substituted aryl, heteroaryl, and substituted heteroaryl.
73. A compound according to claim 65 wherein Z, W, and W' are H; and R<sup>6</sup> is selected from the group of -H and lower alkyl.
74. A compound according to claim 73 wherein V is selected from the group of aryl and substituted aryl.
75. A compound according to claim 74 wherein V is selected from the group of phenyl, 3,5-dichlorophenyl, 3-bromo-4-fluorophenyl, 3-chlorophenyl, 2-bromophenyl, and 3-bromophenyl.
76. A compound according to claim 73 wherein V is selected from the group of heteroaryl and substituted heteroaryl.
77. A compound according to claim 76 wherein V is 4-pyridyl.
78. A compound according to claim 65 wherein Z is selected from the group of -OR<sup>2</sup>, -R<sup>2</sup>, -OCOR<sup>3</sup>, -OCO<sub>2</sub>R<sup>3</sup>, -NHCOR<sup>2</sup>, -(CH<sub>2</sub>)<sub>p</sub>-OR<sup>12</sup>, and -(CH<sub>2</sub>)<sub>p</sub>-SR<sup>12</sup>.
79. A compound according to claim 65 wherein W and W' are the same group.

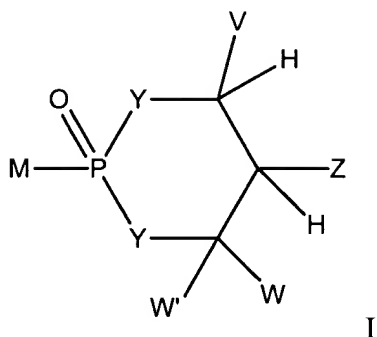
80. A compound according to claim 79 wherein Z, W, and W' are H.
81. A compound according to claim 66 wherein M is attached to phosphorus via an oxygen or nitrogen atom.
82. A compound according to claim 81 wherein V is selected from the group of aryl and substituted aryl.
83. A compound according to claim 82 wherein V is selected from the group of phenyl, 3,5-dichlorophenyl, 3-bromo-4-fluorophenyl, 3-chlorophenyl, 2-bromophenyl, and 3-bromophenyl.
84. A compound according to claim 81 wherein V is selected from the group of heteroaryl and substituted heteroaryl.
85. A compound according to claim 84 wherein V is 4-pyridyl.
86. A compound according to claim 81 wherein V is selected from the group of phenyl, phenyl substituted with 1-2 halogens and 4-pyridyl and MH is selected from the group of etoposide, doxorubicin, and taxol.
87. A compound according to claim 65 wherein MH is from the class epipodophyllotoxins.
88. A compound according to claim 87 wherein MH is selected from the group of Etoposide, Teniposide, NK-611, GL-331, and Azatoxin.



89. A compound according to claim 65 wherein MH is from the class Camptothecins.
90. A compound according to claim 89 where MH is selected from the group of Camptothecin, Topotecan, Irinotecan, Lurtotecan, 9-aminocamptothecin, GL-211, DX-8951F, SKF 107874, and SKF 108025.
91. A compound according to claim 89 wherein MH is attached to phosphorus via the C-20 hydroxyl group.
92. A compound according to claim 89 wherein MH is selected from the group of Camptothecin, Topotecan, Irinotecan, Lurtotecan, and 9-aminocamptothecin.
93. A compound according to claim 65 wherein MH is selected from the class combretastatin analogues.
94. A compound according to claim 65 wherein MH is selected from the class of anthrapyrazoles.
95. A compound according to claim 65 wherein MH is from the class of Anthracyclines.
96. A compound according to claim 95 wherein MH is selected from the group of Doxorubicin, Daunorubicin, Idarubicin, Pirarubicin, and Epirubicin.
97. A compound according to claim 95 wherein MH is attached to phosphorus via a glycosidic amine.

98. A compound according to claim 95 wherein  
thorus via an alcohol or phenolic hydroxy.
99. A compound according to claim 95 wherein  
thorus via a glycoside hydroxyl.
100. A compound according to claim 96 wherein  
of Pirarubicin and Doxorubicin.
101. A compound according to claim 100 wherein  
thorus via a glycosidic amine, an alcohol or a phenolic
102. A compound according to claim 65 wherein  
me antibiotics.
103. A compound according to claim 65 wherein  
es.

104. A compound of formula I:



wherein

Z is selected from the group of:

-CHR<sup>2</sup>OH, -CHR<sup>2</sup>OC(O)R<sup>3</sup>, -CHR<sup>2</sup>OC(S)R<sup>3</sup>, -CHR<sup>2</sup>OCO<sub>2</sub>R<sup>3</sup>, -CHR<sup>2</sup>OC(O)SR<sup>3</sup>,  
-CHR<sup>2</sup>OC(S)OR<sup>3</sup>, SR<sup>2</sup>, -CH<sub>2</sub>aryl, -CH(aryl)OH, -CH(CH=CR<sup>2</sup>)OH, -CH(C≡CR<sup>2</sup>)OH;  
and -CH<sub>2</sub>NHaryl;

V, W and W' are independently selected from the group of -H, alkyl, aralkyl,  
and alicyclic;

with the provisos that:

a) when Z is CHR<sup>2</sup>OH, then M is not -NH(lower alkyl), -N(lower alkyl)<sub>2</sub>,  
-NH(lower alkylhalide), -N(lower alkylhalide)<sub>2</sub> or -N(lower alkyl)(lower alkylhalide);

b) when V is aryl or substituted aryl, then M is not -O(D) where D is  
hydrogen, a metal ion or an ammonium ion; and

R<sup>2</sup> is selected from the group of R<sup>3</sup> and -H;

R<sup>3</sup> is selected from the group of alkyl, aryl, alicyclic, and aralkyl;

R<sup>6</sup> is selected from the group of -H, lower alkyl, acyloxyalkyl,  
alkoxycarbonyloxyalkyl, and lower acyl;

each Y is independently selected from the group of -O-, and -NR<sup>6</sup>-;

M is selected from the group of drugs MH containing an -OH, -NHR<sup>2</sup>, or

-SH group, and that is attached to the phosphorus in formula I via O, N, or S of said OH, -NHR<sup>2</sup>, or SH group;  
and pharmaceutically acceptable prodrugs and salts thereof.

105. A compound according to claim 104 wherein MH is selected from the group of antiviral, anticancer, antihyperlipidemic, anti-inflammatory, antifibrotic, anti-diabetic and antiparasitic agents, with the proviso that said anti-diabetic agent is not an FBPase inhibitor.

106. A compound according to claim 105 wherein MH is selected from the group of etoposide, teniposide, NK-611, GL-331, camptothecin, irinotecan, 9-aminocamptothecin, GG-211, topotecan, lurtotecan, DX-8951F, SKF 107874, SKF 108025, docetaxel, FCE-28161, paclitaxel, mitoxantrone, combretastatin A-4, Azatoxin, mycophenolic acid, coformycin, deoxycorformycin, S,S-dioxolane Combretastatin A-4, doxorubicin, daunorubicin, idarubicin, epirubicin, pirarubicin, mitomycin, eflornithine, piroxantrone, mitoxantrone, neocarzinostatin, esperamicin, calicheamicin theta, and losoxantrone.

107. A compound according to claim 106 wherein MH is selected from the group of etoposide, teniposide, doxorubicin, pirarubicin, mitoxantrone, topotecan, irinotecan, combretastatin A-4, S,S-dioxolane combretastatin, neocarzinostatin, and calicheamicin.

108. A compound according to claim 104 wherein at least one Y group is -O-.

109. A compound according to claim 108 wherein both Y groups are -O-, or when one Y group is -O-, then it is located closest to the W' and W groups.

110. A compound according to claim 107 wherein both Y groups are -O-.
111. A compound according to claim 104 wherein V, W, and W' are -H.
112. A compound according to claim 104 wherein W and W' are the same group.
113. A compound according to claim 112 wherein V, W, and W' are H.
114. A compound according to claim 104 wherein M is attached to phosphorus via an oxygen or nitrogen atom.
115. A compound according to claim 111 wherein Z is selected from the group of  $-\text{CHR}^2\text{OH}$ ,  $-\text{CHR}^2\text{OC}(\text{O})\text{R}^3$ , and  $-\text{CHR}^2\text{OCO}_2\text{R}^3$ , and wherein  $\text{R}^2$  is H or aryl.
116. A compound according to claim 115 wherein  $\text{R}^2$  is -H, and Y is -O-.
117. A compound according to claim 104 wherein MH is from the class epipodophyllotoxins.
118. A compound according to claim 117 wherein MH is selected from the group of Etoposide, Teniposide, NK-611, GL-331, and Azatoxin.
- ~~119. A compound according to claim 104 wherein MH is from the class Camptothecins.~~
- ~~120. A compound according to claim 119 where MH is selected from the group of Camptothecin, Topotecan, Irinotecan, Lurtotecan, 9-aminocamptothecin,~~

121. A compound according to claim 119 wherein MH is attached to phosphorus via the C-20 hydroxyl group.

123. A compound according to claim 104 wherein MH is selected from the class combretastatin analogues.

124. A compound according to claim 104 wherein MH is selected from the class of anthrapyrazoles.

125. A compound according to claim 104 wherein MH is from the class of Anthracyclines.

126. A compound according to claim 125 wherein MH is selected from the group of Doxorubicin, Daunorubicin, Idarubicin, Pirarubicin, and Epirubicin.

127. A compound according to claim 125 wherein MH is attached to phosphorus via a glycosidic amine.

128. A compound according to claim 125 wherein MH is attached to phosphorus via an alcohol or phenolic hydroxy.

129. A compound according to claim 125 wherein MH is attached to phosphorus via a glycoside hydroxyl.

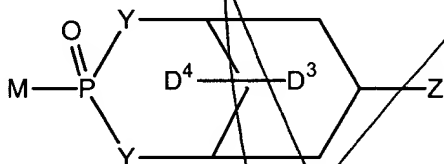
130. A compound according to claim 126 wherein MH is selected from the group of Pirarubicin and Doxorubicin.

131. A compound according to claim 130 wherein MH is attached to phosphorus via a glycosidic amine, an alcohol or a phenolic hydroxyl.

132. A compound according to claim 104 wherein MH is from the class Eneidyne antibiotics.

133. A compound according to claim 104 wherein MH is from the class Taxanes.

134. A compound of formula VIII:



VIII

wherein

Z' is selected from the group of -OH, -OC(O)R<sup>3</sup>, -OCO<sub>2</sub>R<sup>3</sup>, and -OC(O)SR<sup>3</sup>;

D<sup>3</sup> and D<sup>4</sup> are independently selected from the group of -H, alkyl, -OH, and -OC(O)R<sup>3</sup>;

R<sup>2</sup> is selected from the group of R<sup>3</sup> and -H;

R<sup>3</sup> is selected from the group of alkyl, aryl, alicyclic, and aralkyl;

each Y is independently selected from the group of -O-, and -NR<sup>6</sup>-;

M is selected from the group of drugs MH containing an -OH, -NHR<sup>2</sup>, or

-SH group, and that is attached to the phosphorus in formula I via O, N, or S of said OH, -NHR<sup>2</sup>, or SH group;  
and pharmaceutically acceptable prodrugs and salts thereof.

135. A compound according to claim 134 wherein MH is selected from the group of antiviral, anticancer, antihyperlipidemic, anti-inflammatory, antifibrotic, anti-diabetic and antiparasitic agents, with the proviso that said anti-diabetic agent is not an FBPase inhibitor.

136. A compound according to claim 135 wherein MH is selected from the group of etoposide, teniposide, NK-611, GL-331, camptothecin, irinotecan, 9-aminocamptothecin, GG-211, topotecan, lurtotecan, DX-8951F, SKF 107874, SKF 108025, docetaxel, FCE-28161, paclitaxel, mitoxantrone, combretastatin A-4, Azatoxin, mycophenolic acid, coformycin, deoxycoformycin, S,S-dioxolane Combretastatin A-4, doxorubicin, daunorubicin, idarubicin, epirubicin, pirarubicin, mitomycin, eflornithine, piroxantrone, mitoxantrone, neocarzinostatin, esperamicin, calicheamicin theta, and losoxantrone.

137. A compound according to claim 136 wherein MH is selected from the group of etoposide, teniposide, doxorubicin, pirarubicin, mitoxantrone, topotecan, irinotecan, combretastatin A-4, S,S-dioxolane combretastatin, neocarzinostatin, and calicheamicin.

138. A compound according to claim 134 wherein at least one Y group is -O-.

139. A compound according to claim 139 wherein both Y groups are -O-.



140. A compound according to claim 134 wherein M is attached to phosphorus via an oxygen or nitrogen atom.
141. A compound according to claim 134 wherein MH is from the class epipodophyllotoxins.
142. A compound according to claim 141 wherein MH is selected from the group of Etoposide, Teniposide, NK-611, GL-331, and Azatoxin.
143. A compound according to claim 134 wherein MH is from the class Camptothecins.
144. A compound according to claim 143 where MH is selected from the group of Camptothecin, Topotecan, Irinotecan, Lurtotecan, 9-aminocamptothecin, GL-211, DX-8951F, SKF 107874, and SKF 108025.
145. A compound according to claim 143 wherein MH is attached to phosphorus via the C-20 hydroxyl group.
146. A compound according to claim 143 wherein MH is selected from the group of Camptothecin, Topotecan, Irinotecan, Lurtotecan, and 9-aminocamptothecin.
144. A compound according to claim 134 wherein MH is selected from the class combretastatin analogues.
145. A compound according to claim 134 wherein MH is selected from the class of anthrapyrazoles.

146. A compound according to claim 134 wherein MH is from the class of Anthracyclines.

147. A compound according to claim 146 wherein MH is selected from the group of Doxorubicin, Daunorubicin, Idarubicin, Pirarubicin, and Epirubicin.

148. A compound according to claim 146 wherein MH is attached to phosphorus via a glycosidic amine.

149. A compound according to claim 146 wherein MH is attached to phosphorus via an alcohol or phenolic hydroxy.

150. A compound according to claim 146 wherein MH is attached to phosphorus via a glycoside hydroxyl.

151. A compound according to claim 147 wherein MH is selected from the group of Pirarubicin and Doxorubicin.

152. A compound according to claim 151 wherein MH is attached to phosphorus via a glycosidic amine, an alcohol or a phenolic hydroxyl.

153. A compound according to claim 134 wherein MH is from the class Enediyne antibiotics.

154. A compound according to claim 134 wherein MH is from the class Taxanes.

155. A compound according to claim 12, wherein the hydrogen geminal to V and the oxygen attached to the phosphorus via a double bond are in a cis configuration with respect to each other.

156. A compound according to claim 65, wherein the hydrogen geminal to V and the oxygen attached to the phosphorus via a double bond are in a cis configuration with respect to each other.

157. A compound according to claim 12 wherein W' and Z are H; W and V are both the same aryl, substituted aryl, heteroaryl, or substituted heteroaryl, and V and W are trans to each other.